

Fea's Petrel *Pterodroma feae* in the Azores

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Received 20 December 1993

Three species of gadfly petrel closely related to the Soft-plumaged Petrel *Pterodroma mollis* of the southern hemisphere occur in the North Atlantic (Bourne 1983, in press). All three are Red Data Book species, listed as rare or endangered (Collar & Stuart 1985). The Bermuda Petrel *P. cahow* breeds only in Bermuda where it has been brought back from the verge of extinction by intensive conservation measures (Lever 1984). The Freira (Madeira Petrel) *P. madeira* is extremely rare, with a population of less than 50 pairs nesting in a single colony on Madeira (Buckle & Zino 1989). Fea's Petrel (Gon-gon or Bugio Freira) *P. feae* nests on Bugio in the Desertas (near Madeira) and in the Cape Verde Islands, and has a total population estimated at a few hundred pairs (Zino & Zino 1986). Bourne (1965) predicted that an undiscovered *Pterodroma* intermediate in character between *P. cahow* and *P. feae* might exist in the Azores, where little survey of the status and numbers of seabirds had then been carried out. In 1990 a *Pterodroma* was caught at night at a seabird colony in the Azores. That bird was found to be closely similar in appearance and in most measurements to *P. feae* from Bugio, but with a longer tail, matching that of *P. cahow* (Bibby & del Nevo 1991). These authors concluded their account of this specimen by suggesting that a population of *Pterodroma* intermediate between *P. cahow* and *P. feae* may breed in the Azores, and quoted W. R. P. Bourne as suggesting that such an intermediate might require *feae* and *cahow* to be classified as a single species, presumably with the Azores birds as a third subspecies.

In September 1993 we visited many islands in the Azores archipelago to study seabird populations and ecology. We spent several nights at each of various sites mist-netting Madeiran Storm Petrels *Oceanodroma castro*, Little Shearwaters *Puffinus assimilis* and Bulwer's Petrels *Bulweria bulwerii*, and catching Cory's Shearwaters *Calonectris diomedea* by hand. On most nights between 14 and 26 September 1993 we caught 40–160 petrels and shearwaters in two 18 m four-shelf mist nets. Almost all birds were caught between 2100 and 2300 hrs local time as numbers flying over the colonies were much reduced after about 2230 hrs, and we generally ceased netting before midnight. A first-quarter moon combined with clear skies seemed to keep activity of Cory's Shearwaters low until after the moon had set, but seemed to have little effect on the timing of storm petrel activity.

On our last night we caught 150 storm petrels without using a tape lure, the nets being set on the cliff-top edge of a small islet. At 2310 hrs, by which time the capture rate had fallen close to zero, a gadfly petrel flew into the net. Having handled many thousands of Soft-plumaged Petrels on Gough Island, RWF immediately recognised that the bird was not *Pterodroma mollis* as it was very much more bulky, had a uniformly dark underwing and a conspicuously heavy bill, and lacked

the pectoral band normally present in that species (Plate 1). It lacked the pale rump of *P. cahow* or *P. hasitata*, and its large size and massive bill excluded *P. madeira*. We therefore identified it as a specimen of *P. feae* either as a vagrant from Bugio or the Cape Verde Islands or as an Azores bird from an unknown breeding population.

The bird was white below, grey-brown above but the dorsal surface of the tail was a distinctively pale ashy-grey. It had a dark patch around the eye, dark pectoral spots covered by the folded wings but no band across the breast. The eye was brown, the underwing dark and uniform apart from white inner underwing coverts at the leading edge of the wing and paler grey-brown axillaries with off-white bases. The bill was black and impressively massive, the legs and proximal half of the feet pink, the distal half and nails being inky black. The white flanks were slightly mottled with grey (Plate 1). In all respects the plumage and soft parts agreed with the description of the bird caught by Bibby & del Nevo (1991) except that they described the axillaries as white whereas in our bird they were pale proximally but grey-brown distally. Our specimen had a brood patch that had been completely bare but was now about half refeathered. It had no active moult of flight feathers and no sign of heterogeneous ages of coverts.

We retained the bird in a large bag until daylight in order to be able to examine it thoroughly in good light. In the early morning we searched its plumage for feather lice. The lice we obtained were examined by Dr R. L. Palma, Museum of New Zealand, Wellington, and found to include an adult male *Halipeurus theresae*, a species previously found on *P. feae* from the Desertas (Zonfrillo 1993), and *P. axillaris* from the Chatham Islands, New Zealand (Pilgrim & Palma 1982), but not found on *P. madeira* or *P. cahow* (Zonfrillo 1993). We also took a spot of blood which could be used for DNA analysis to compare among *Pterodroma* taxa, and ringed the bird.

On release, the bird flew low over the water with rapid wingbeats, the pale grey tail being a pronounced feature in flight in contrast to the rather uniform and dark upperwing and back. Haney *et al.* (1993) report a sight record of a bird identified as *P. feae* in the western Atlantic, and also remark on the pale tail as one feature of this species.

Because we were aware of the critical nature of the measurements in assigning the individual to a taxon (and because we wondered whether it might be the same individual caught but not ringed by Bibby & del Nevo) the bird was measured and results recorded independently by LRM and RWF. Our measurements of bill length differed by 0.4 mm but all other measurements were within 0.2 mm. Our measurements, those reported by Bibby & del Nevo (1991) and measurements of *P. feae* from Bugio and the Cape Verde Islands from live birds and from museum skins (data from Cramp & Simmons 1977 and from the Museum of Natural History, Paris, measured by LRM) are given in Table 1 for comparison.

Some useful comparisons can be made from these data. The two Azores specimens are clearly too large to be *P. madeira*. Our bird was closely similar in measurements to the specimen caught by Bibby & del Nevo (1991) except in tail length. Our specimen had a tail length of



Plate 1. The bird, identified as *Pterodroma fcae*, caught in the Azores in September 1993.

TABLE 1

Measurements of birds from North Atlantic *Pterodroma* populations. Where data are available, ranges are given in parentheses below means. Sources are listed below the table.

Locality/species	Azores	Azores	Bugio	Bugio	<i>P. faae</i>	C. Verde	C. Verde	<i>P. cahoro</i>	<i>P. madeira</i>
Live or skin Reference	L 1	L 2	L 3	S 1	S 4	S 5	S 1	S 2	L 3
Weight (g)	295	325	311 (275-355)	325 (295-336)	—	—	—	—	204 (175-231)
Wing length	269.5	270	268 (258-282)	268.8 (267-272)	268 (263-273)	266	266.7 (264-272)	260	247 (241-254)
Tail length	112.0	128	110 (106-155)	111.2 (103-120)	113 (108-115)	105	103.9 (97-115)	124	105 (100-108)
Tarsus	35.0	35.6	35.8 (32-41)	35.6 (34-36)	35.0 (32-38)	34.6	34.9 (33-36)	36	32.9 (29.5-38)
Head	73.1	—	—	72.1 (71-73)	—	—	71.1 (68-74)	—	—
Bill length	28.5	29.7	29.1 (27-31)	29.1 (28-30)	28.4 (26-30)	28.6	28.5 (27-30)	30	25.0 (22-26)
Bill depth at gonyx	12.8	—	—	12.5 (12.1-12.9)	—	—	11.5 (10.6-12.3)	—	—
Bill depth at nostril	15.0	—	14.7 (13-16)	14.5 (13.1-15.4)	—	—	13.4 (12.6-14.5)	—	11.2 (10-12)
Mid-toe	—	45.0	46.4 (42-50)	—	45.0 (41-47)	46.1	—	51	42.5 (41.5-43)
Sample size	1	1	17-40	4-5	18	12-15	7-11	1	7-13

Refs. 1 this study (Bugio and C. Verde columns are measurements of study skins in the Paris Museum of Natural History); 2 Bibby & del Nevo (1991); 3 Zino & Zino (1986); 4 Cramp & Simmons (1977); 5 Jouanin *et al.* (1969).

112 mm, which agrees almost exactly with that of birds from Bugio. We cannot say whether the much longer tail length recorded by Bibby & del Nevo (1991) is evidence of extensive variability in this character, or of difference in measurement technique. Setting aside their tail measurement, all other measurements from the two Azores specimens match the range of *P. feae* from Bugio, though bill depth (the most striking character of the bird in the hand) is close to the upper limit found in the Bugio population. The differences in measurements of the birds caught in the Azores by Bibby & del Nevo (1991) and ourselves seem to rule out the possibility that the same individual was caught twice.

It is noteworthy that *P. feae* from the Cape Verde Islands is generally smaller than our specimen from the Azores or the birds from Bugio. This is especially noticeable for the tail length and bill depth at gonys, though it is true of every character measured (Table 1). Comparing between measurements (made by LRM) of *P. feae* study skins from Bugio and from the Cape Verde Islands, now in the Paris Museum, tail length was significantly longer among the birds from Bugio ($t=2.34$, $P<0.05$) as was bill depth at gonys ($t=3.28$, $P<0.001$). The population of *P. feae* at Bugio is thought to be only a few dozen pairs, whereas several hundred pairs breed in the Cape Verde Islands (Cramp & Simmons 1977). The small size of the Bugio population and lack of compatibility of measurements of the Azores specimens with the Cape Verde birds strengthen the suspicion that there may be an Azores breeding population of *P. feae*, since the chances of two wandering birds from the very small Bugio population being caught at Azores seabird islets seem very small. However, although the distribution of the species at sea is not well known, in addition to occurring off the United States it has been recorded in Israel and regularly near the Canary Islands and off western Africa (Haney *et al.* 1993). With such a wide pelagic range, visits of non-breeders to the Azores would not be unexpected. The species is also known to associate at sea with Cory's Shearwaters (Lambert 1980, Haney *et al.* 1993) and rafting Cory's Shearwaters might attract non-breeding *P. feae* to Azores shearwater colonies. Although neither *P. mollis*, *P. feae* nor *P. madeira* appear in Le Grand's (1983) Azores checklist, a bird of one of these forms was seen at sea close to the Azores (37° 56'N, 20° 48'W) in August 1992 by Moore (in press).

Bibby & del Nevo (1991) suggested that the bird which they caught might nest on the islet where they caught it and that the lack of any characteristic *Pterodroma* calls at night could be attributed to the drowning effects of Cory's Shearwater calls. We visited the islet where they caught their bird during September 1993 and spent several nights mist-netting there. We spent two days censusing the Cory's Shearwater colony on that islet and ringing chicks. Using mark-recapture we estimated there to be rather less than 200 burrows containing Cory's Shearwater chicks. On the islet where we caught a *Pterodroma* we estimated the Cory's Shearwater population to be even smaller, with less than 100 chicks present during our visit. Thus we doubt that the shearwater activity would mask the calling of *Pterodroma* petrels if they